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APPROVAL REPORT

FB11/FB22, FB33, FB44, AND DOORDAM OPENING BARRIERS FLOOD ABATEMENT EQUIPMENT

Prepared for:

Presray Corporation
32 Nelson Hill Road
Wassaic NY 12592
USA

Project: 3040412
Class: 2510
Date of Approval: March 29, 2012

Authorized by: _____
Richard B. Dunne, Manager – Fire Protection Group

FM Approvals
1151 Boston-Providence Turnpike
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**FB11/FB22, FB33, FB44, AND DOORDAM
OPENING BARRIERS
FLOOD ABATEMENT EQUIPMENT**

from

**Presray Corporation
32 Nelson Hill Road
Wassaic NY 12592
USA**

I INTRODUCTION

1.1 Presray Corporation requested Approval of their Models FB11/FB22, FB33, FB44, and DoorDam opening Barriers for use as flood abatement equipment.

1.2 This Report may be freely reproduced only in its entirety and without modification.

1.3 **Standards**

The applicable portions of the following standards were used for the examination and evaluation of the equipment and applications in this report.

Referenced Standard		
Title	**Class Number**	**Date**
FM Approvals Standard 2510, Flood Abatement Equipment	2510	December 2006
FM Approvals Standard 5600, Clean Agent Extinguishing Systems	5600	February 2009

1.4 **Listing:** The product will appear in the Building Materials Division of the FM Approval Guide, an online publication, in the Flood Abatement Equipment (FM Approvals Class 2510) section.

II DESCRIPTION

2.1 These barriers are used to temporarily close openings in building walls when the danger of flood water infiltration is anticipated.

2.2 The FB33 and DoorDam barriers are used for pedestrian openings up to 3 ft (0.91 m) in width. These barriers are placed in pre-installed brackets in the doorway and are secured in place by an expanding jackscrew mechanism and auxiliary clamps. The DoorDam is a lighter weight design that is sold for consumer use. The FB33 is a heavier, commercial and industrial design. Both types of barrier can be manually placed or removed by a single person without the need for any materials handling equipment.

2.3 The FB11/FB22 barriers are used for larger openings, up to 13 ft (3.96 m) in width. They also require the pre-installation of mounting frame in the opening. These are lift-out barriers of sufficient mass that powered materials handling equipment, such as a lift truck

or crane, are required for installation. After insertion in the frame, the barrier is latched into place and its inflatable gasket is pneumatically pressurized to seal against the sides and bottom of the opening.

2.4 The FB44 barrier can also be used for openings up to 13 ft (3.96 m) in width. It also requires the pre-installation of mounting bracket. In addition, it is hinged to one side of the mounting frame and can remain permanently in place, in the open position. When needed, it can be swung shut, latched to the opposite jamb, and sealed by the same type of inflatable gasket as the FB11/FB22 barriers. Powered material handling equipment is only required for the initial installation. When in place, it can be easily moved between the open and closed positions by a single individual.

2.5 All barriers are suitable to prevent water intrusion up to a 3 ft (0.91 m) depth. However, the building wall should be evaluated to verify that it can also withstand the resulting hydrostatic load.

2.6 The attached manufacturer's brochures provide further information on the configuration of these barriers.

III EXAMINATIONS AND TESTS

3.1 All evaluations were to the criteria of the referenced sections of Approval Standard 2510.

3.2 Per Section 4.1.1, Examination, the manufacturer provided sample barriers and components for examination and testing as described for each following evaluation. All test samples were reviewed against the manufacturer's drawings and specifications and judged to be adequately representative of their designs.

3.2 Per Section 4.1.2, Hydrostatic Test Strength, the entire pressure containing envelope of the inflatable gaskets for the FB11/FB22 and FB44 barriers were tested in an installed FB44 barrier in a 13 ft (3.96) wide opening. The components of the assembly included the seal, the pressure gauge, the valve, and the interconnecting fittings and tubing. Since the maximum rated pressure of this assembly is 30 psi (2.07 bar) the 150 percent required pressure was 45 psi (3.10 bar). This pressure was applied with air and held for 5 minutes with no leakage or other evidence of failure. Subsequent to this test, all components remained intact and functional.

3.3 A System Leakage Test, per Section 4.1.3 was not performed as it was trivial and redundant to the Hydrostatic Test Strength evaluation for this product, since it requires a test pressure of 1.2 times rating, as opposed to the 1.5 times requirement of the latter test.

3.4 A Barrier Membrane Water Leakage test per Section 4.1.4 was not required, since these barriers do not use membranes to prevent leakage. Instead, they use metal structures and perimeter gaskets.

3.5 Component Durability – Cycling was performed per Section 4.1.5. The tested components included the jackscrew assembly for the FB33 and DoorDam and the tank valve for the FB11/FB22 and FB44. These items exhibited no decreased function after 500 cycles of operation.

3.6 Impact and Wear Resistance testing per Section 4.1.6 was not required as these assemblies contain no components relevant to these tests.

3.7 The Abrasion Resistance test of Section 4.1.7 was likewise not required since these assemblies contain no membranes.

3.8 The Vibration Resistance test of Section 4.1.8 was successfully conducted on the component judged vulnerable to failure under vibration. The J-Brace and Compression Clip assembly for the FB 33 and DoorDam and the Ball Knob assembly for the FB11/FB22 and FB44. All components remained fastened during the vibration sequence and exhibited no loss of function subsequent to this test.

3.9 A Salt Spray Corrosion – Residue Build-Up test was conducted per Section 4.1.9. Samples included the J-Brace and Compression Clip assembly for the FB 33 and DoorDam and the Latch Assembly for the FB11/FB22 and FB44. All components remained fully functional after this exposure.

3.10 The J-Brace and Compression Clip assembly for the FB33 and DoorDam were subjected to the Environmental Corrosion Resistance test of Section 4.1.10. This assembly remained fully functional after this exposure.

3.11 The Hail Resistance test of Section 4.1.11 was not required since no membranes are used in these assemblies.

3.12 The Tensile Strength, Ultimate Elongation, and Tensile Set tests of section 4.1.12 were conducted on the two sealing materials used in these assemblies. Table 3.12, below, presents the successful average data.

Table 3.12
Elastomer Physical Property Tests

Material	Exposure	Tensile Stress psi (MPa)	Elongation Percent	Percent Original Tensile Stress	Percent Original Elongation	Tensile Set Percent
FB11/FB22 Seal Skin	None	717 (4.94)	332	N.A.	N.A.	16
	212°F (100°C)	697 (4.81)	239	97.2	71.8	N.A.
FB33 & DoorDam Gasket	None	2646 (18.24)	572	N.A.	N.A.	7
	212°F (100°C)	2273 (15.67)	532	85.9	93.0	N.A.

Criteria for Success
Tensile Strength >/= 500 psi (3.46 MPa)
Elongation >/= 100 percent
Tensile Set </= 19 percent

3.13 An Ultraviolet Light and Water Test was conducted per Section 4.1.13. Samples of the FB11/FB22 and FB44 Seal Skin and FB33 and DoorDam Gasket materials were tested. Neither material displayed any cracking or crazing as a result of this exposure.

3.14 An Air Oven Aging Test was conducted per Section 4.1.14. A sample of the Ball Knob used on the FB11/FB22 barriers was tested. No cracking or crazing was noted subsequent to this test.

3.15 An Accelerated Aging Test was conducted per Section 4.1.15. Samples of the FB11/FB22 Seal Skin and FB33 and DoorDam Gasket materials were tested. The successful average data is shown in Table 3.12, above.

3.16 A Compression Set Test was conducted per Section 4.1.16. Only the FB33 and DoorDam gasket material was tested because the inflatable gasket material used for the FB11/22 and FB44 is not under compression when inflated. Compression set averaged 3.2 percent, well under the 15 percent allowable maximum.

3.17 The Extreme Temperature Operation test of Section 4.1.17 was judged to be irrelevant to the designs of these barriers, since no unfolding of membranes or similar actions are required to install these barriers.

3.18 The Cap / Valve Locking/Supervision evaluation of Section 4.1.18 was also considered to be irrelevant to these designs.

3.19 The Tear and Puncture Resistance Test of Section 4.1.19 was also not required, since these barriers do not employ a sealing membrane.

3.20 The Biological / Degradation Resistance Testing of Section 4.1.20 was also inappropriate for these barriers, since their few elastomeric components are synthetic materials not readily sensitive to biological attack.

3.21 The entirety of Section 4.2, Temporary Perimeter Flood Barriers, does not pertain to these building opening barriers.

3.22 Section 4.3, Opening Barriers, was addressed by testing per its subsections, as described below.

3.23 Section 4.3.1, Initial Deployment, was evaluated for all barriers. Table 3.23, below, presents the results.

Table 3.23

Initial Deployment

Evaluation	FB11/FB22	FB33	FB44	DoorDam
Person Power Required	2 person with power equipment	1 person	1 person	1 person
Installation Duration min:s	02:40	02:44	01:06	01:13
Foundation Requirements	Installed Frame	Concrete, level and square	Installed Frame	Concrete, level and square
Material & Equipment Required	Powered lifting equipment & pressurized air	None	Pressurized air	None

Table 3.23				
Initial Deployment				
Evaluation	**FB11/FB22**	**FB33**	**FB44**	**DoorDam**
Ease of Construction	Easy with lifting equipment	Easy	Easy	Easy
Special Construction Considerations	Barrier must be lifted high enough to clear tabs on frame jambs.	None	None	None
Application Limitations	None	Requires flat surface	None	Requires flat surface
Damage During Construction	None	None	None	None
Result of Visual Examination	Satisfactory	Satisfactory	Satisfactory	Satisfactory

3.24 A Hydrostatic Load Test was performed per Section 4.3.2. The successful results are presented in Table 3.24, below.

Table 3.24				
Hydrostatic Test				
Evaluation	**FB11/FB22**	**FB33**	**FB44**	**DoorDam**
Water Depth, ft (m)	3.0 (0.91)	3.0 (0.91)	3.0 (0.91)	3.0 (0.91)
Width of Opening, ft (m)	13.2 (4.02)	3.0 (0.91)	13.2 (4.02)	3.0 (0.91)
Wetted Perimeter of Opening, ft (m)	19.2 (5.85)	9.0 (2.74)	19.2 (5.85)	9.0 (2.74)
Maximum Allowable Leakage Rate, gal/hr (L/h)	1.54 (5.83)	0.72 (2.73	1.54 (5.83)	0.72 (2.73
Measured Leakage Rate, gal/hr (L/h)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Result of Visual Examination	Satisfactory	Satisfactory	Satisfactory	Satisfactory(

Criterion for Success
Leakage Rate </= 0.08 gal/h/ft (0.99 L/h/m) of wetted perimeter over 22 hours.

3.25 A Dynamic Impact Load Test was conducted per Section 4.3.3 with satisfactory results. Table 3.25, below, displays the satisfactory data.

Table 3.25				
Dynamic Impact Test				
Evaluation	**FB11/FB22**	**FB33**	**FB44**	**DoorDam**
Redeployment Prior to First Impact Duration' min:s	02:30	03:30	01:13	02:26
Mass of Impact Object, lb (kg)	112 (50.8)	112 (50.8)	112 (50.8)	112 (50.8)
Drop Height, ft (m)	4.0 (1.22)	4.0 (1.22)	4.0 (1.22)	4.0 (1.22)
Force of Impact, lb (N)	112 (498)	112 (498)	112 (498)	112 (498)
Calculated Impact Energy, calorie (J)	145 (607)	145 (607)	145 (607)	145 (607)
Location of Impact	Horizontal Center, approximately 29 in. (74 cm) high	Horizontal Center, approximately 29 in. (74 cm) high	Horizontal Center, approximately 29 in. (74 cm) high	Horizontal Center, approximately 29 in. (74 cm) high
Repairs Required	None	None	None	None
Result of Visual Examination	No visible damage – acceptable result	Approximately 1/16 in. (0.2 cm) dent, but no loss of function – acceptable result	No visible damage – acceptable result	Approximately 1/4 in. (0.6 cm) dent, but no loss of function – acceptable result
First Repetition of Hydrostatic Test – 1 hour duration				
Maximum Allowable Leakage Rate, gal/hr (L/hr)	1.54 (5.83)	0.72 (2.73)	1.54 (5.83)	0.72 (2.73
Measured Leakage Rate, gal/hr (L/hr)	0.0 (0.0)	0.15 (0.57)	0.0 (0.0)	0.0 (0.0)
Repairs Required	None	None	None	None
Result of Visual Examination	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Redeployment Prior to Second Impact Duration' min:s	02:07	03:30	01:16	01:07

Table 3.25				
Dynamic Impact Test				
Evaluation	**FB11/FB22**	**FB33**	**FB44**	**DoorDam**
Location of Impact	Horizontal as near to Perimeter as Possible, approximately 29 in. (74 cm) high	Horizontal as near to Perimeter as Possible, approximately 29 in. (74 cm) high	Horizontal as near to Perimeter as Possible, approximately 29 in. (74 cm) high	Horizontal as near to Perimeter as Possible, approximately 29 in. (74 cm) high
Repairs Required	None	None	None	None
Result of Visual Examination	No visible damage – acceptable result	Approximately 1/4 in. (0.6 cm) dent, but no loss of function – acceptable result	No visible damage – acceptable result	Approximately 1/2 in. (1.3 cm) dent, but no loss of function – acceptable result
Second Repetition of Hydrostatic Test – 1 hour duration				
Maximum Allowable Leakage Rate, gal/hr (L/hr)	1.54 (5.83)	0.72 (2.73)	1.54 (5.83)	0.72 (2.73)
Measured Leakage Rate, gal/hr (L/hr)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Repairs Required	None	None	Concrete block wall in which barrier was mounted was damaged and created a leakage point. No repairs were required for the barrier.	None
Result of Visual Examination	Satisfactory	Satisfactory	Zero leakage was achieved in second trial, after repair of wall. Satisfactory	Satisfactory

3.26 Section 4.7, Additional Tests, was invoked to evaluate the pressure gauge used to monitor fill pressure for the inflatable gasket used on the FB11/FB22 and FB44 barriers. Two tests from Approval Standard 5600, Clean Agent Extinguishing Systems, were used to evaluate the pressure gauge.

3.27 A Pressure Gauge Impulse Resistance test was conducted per Section 4.23.2 of Approval Standard 5600 on a sample gauge. After 1000 cycles of pressure from 10 to 50 psi (0.69 to 3.45 bar). Subsequently, the sample gauge was evaluated per Section 4.23.1 of the same Approval Standard, Pressure Gauge Accuracy. Performance was satisfactory, as shown in Table 3.27, which displays the average of ascending and descending readings.

Table 3.27
Pressure Gauge Accuracy

Master Gauge Reading, psi (bar)	Sample Gauge Reading, psi (bar)	Variance, percent	Allowable Variance, percent
0	0	0	12
10	10	0	6
20	20	0	6
30	30	0	4
40	40	0	6
50	50	0	6
60	60	0	15

3.28 No other sections of the Approval Standard were relevant to these designs and no other evaluations were deemed to be necessary.

IV MARKING

4.1 The following information appears on the barriers and meets Approval requirements:

- Manufacturer's name and address.
- Production Date
- Serial Number
- Assembly Number
- Appropriate cautions
- The FM Approval Mark

4.2 The attached Manufacturer's drawings DD-FM Tag, DD-LT-Tag, PPR34314, and PRS555 illustrate these markings.

V REMARKS

5.1 Applications of these barriers are subject to the limitations specified and are subject to FM Global acceptance of plans prior to installation at FM Global insured properties.

5.2 This equipment has been evaluated for use in resisting riverine flooding conditions at depths not greater than 3 ft (0.9 m)

5.3 These barriers have been designed and manufactured to perform under the hydrostatic and dynamic loads described in Section III of this report. Building structure design and its capacity to accept loads transferred from these barriers require individual evaluation and are beyond the scope of this Approval evaluation.

VI FACILITIES AND PROCEDURES AUDIT

6.1 An audit of the manufacturing facility for these barriers was conducted as a part of this examination to verify implementation of an appropriate quality assurance program. Its purpose was to determine that the manufacturer's equipment, procedures, and quality program are sufficient to ensure a uniform product representative of that which was examined and tested.

6.2 Follow up facilities and procedures audits (F&PAs) shall be conducted by FM Approvals or its representative program on a quarterly basis, or more frequently if required by jurisdictional authorities.

6.3 FM Approved products shall be produced only at the locations audited by FM Approvals and as specified in the Approval Report. Products bearing the FM Approvals Certification Mark are not permitted to be manufactured at any other location without prior written authorization by FM Approvals.

6.4 The manufacturing site for these barriers is:

Presray Corporation
32 Nelson Hill Road
Wassaic NY 12592
USA

6.5 The facilities and quality control procedures in place at this location have been found to be satisfactory to manufacture product substantially equivalent to that examined and tested as described in this report.

VII MANUFACTURERS RESPONSIBILITIES

7.1 Documentation considered critical to this Approval is on file at FM Approvals and listed in the Documentation File, Section VIII of this report. No changes of any nature shall be implemented unless notice of the proposed change has been given and written authorization obtained from FM Approvals. The Approved Product Revision Report, Form 797, shall be forwarded to FM Approvals as notice of proposed changes.

7.2 It is the manufacturer's responsibility to keep aware of all jurisdictional and FM Approvals requirements, and any changes thereto, which may affect the acceptance and use of these barriers

VIII DOCUMENTATION

Critical Documents		
Document Number	**Description**	**Revision**
98407A132	E-Style Zinc and Yellow Chromate-Plated Steel External Retaining Ring	-
Anchor Ref	Anchor Reference	03/26/ 2010
DD-FM Tag	FM Approval Tag	-
DD-LT-Tag	DoorDam Liability Tag	-
FB11-FB22 FS	FB11-FB22 Fact Sheet	-

Critical Documents		
Document Number	**Description**	**Revision**
FB11-FB22 SS	FB11-FB22 Specification Sheet	-
FB22-XXXXX-01	FB 22 Flood Barrier	-
FB33	Installation, Operation, and Maintenance Manual for FB33 Flood Barrier	-
FB33 FS	FB33 Fact Sheet	-
FB33 SS	FB33 Specification Sheet	-
FB33-XXXXX-03	FB33	-
FB44 FS	FB44 Fact Sheet	-
FB44 SS	FB44 Specification Sheet	-
FB44-XXXXX-02	FB44 Flood Door	-
IM FB22	Installation, Operation, and Maintenance Manual for FB 2 Flood Barrier	-
IMFB44	Installation, Operation, and Maintenance Manual for FB44 Flood Barrier	-
PPR34314	Presray / FM Approval Name Plate	-
PR18571	Manifold	B
PR19685	Stud	-
PR22718	FB 22 Corner Cove for 3/8 in. Jamb Stock	A
PR24496	Locking Bolt 1 in. Diameter	-
PR24497	Latch Body 1 in. Diameter	A
PR24648	Plexiglass Guard	-
PR28434	Adhaco Hinge H-418 Assembly Layout	-
PR30367	Retainer Extrusion for PR18569	A
PR31206	Wheel Assembly	A
PR31352	FB11 & FB22 Handle	-
PR31709	FB33 Handle	B
PR31911	Linkage Arm	A
PR31912	Right Hand Jack Nut	A
PR31913	Left Hand Jack Nut	A
PR32524	DoorDam XL Mounting Angle	C
PR32637	Compression Clip	D
PR32754	Jamb Clip	C
PRS535	Inflatable Seal	W
PRS555	Nameplate	B
PRS582	Inflatable Seals	E
PRS857	Retainer Plate for PRS582, 535	B
PRV4873.003	Valve Fitting (1/8-27NPT Female)	C

Note: The characters “XXXXX” in some document numbers indicate the customer work order number, which is unique to each customer.

IX CONCLUSION

The Presray Corporation Models FB11/FB22, FB33, FB44, and DoorDam opening Barriers meet FM Approvals requirements for use as flood abatement equipment. Since a

duly signed Master Agreement is on file for this manufacturer, Approval is effective the date of this report.

EXAMINATION BY:	**Armand V. Brandao**
TESTING BY:	**Presray Corporation personnel and FM Approvals personnel Armand Brandao, Kalyn Magazu, and John Normington.**
PROJECT DATA RECORD:	**Project 3040412**
ATTACHMENTS:	**Appendix 1 - Product Listing** **Manufacturer's Brochures FB11/FB22, FB33, FB44, & DoorDam** **Manufacturer's Drawings DD-FM Tag, DD-LT-TAG, PPR34314 & PRS555.**

REPORT BY:

Armand V. Brandao, P.E.
Senior Engineering Specialist
Fire Protection Group

REPORT REVIEWED BY:

Brian K. MacDonald
Technical Team Manager
Fire Protection Group

Appendix 1
Approval Guide Listing

The following opening barriers provide protection against riverine flooding up to depths of 3 ft (0.9 m).

DoorDam Removable Flood Panel with compression gasket. For openings up to 3 ft (0.9 m) in width. Expandable by hand crank to fit multiple openings over a 4 in. (100 mm) range. Can be installed in three different configurations. A Style 1 installation uses J-Braces and Compression-Clips on otherwise unmodified building openings with a recess on the water side of the opening a minimum of 1 in. (25 mm) wide and with a minimum of 2 in. (50 mm) deep on either side of opening. A Style 2 installation uses a Z profile jamb bracket on either side of the opening to reinforce the corners of the opening and to create the recess wherein the panel is installed. A Style 3 installation also uses the Z brackets, but mounts them on the face of the wall outside the opening, requiring a minimum of 1 in. (25 mm) of wall on either side of the opening to support the panel. All three styles use the J-Braces and Compression-Clips to compress the gasket against the bottom of the opening.

FB33 Removable Flood Panel with compression gasket. For openings up to 3 ft (0.9 m) in width. Expandable by hand crank to fit multiple openings over a 4 in. (100 mm) range. The FB33 is similar to the DoorDam, but offers a heavier construction. Requires pre-installation of jamb brackets either inside of the opening or on the water side of the wall, with a minimum of 1 in. (25 mm) overlap of the wall on either side of the opening. A variety of bracket arrangements are available. J-Braces and Compression-Clips are used to compress the gasket against the bottom of the opening

FB11/FB22 Aluminum Lift-Out Panel with inflatable seals. For openings up to 13 ft (3.96 m) width. Requires pre-installation of frame, either inside of the opening or on the water side wall face. Requires a pressurized gas supply to inflate seal. Must be removed and stored to return opening to service.

FB44 Side-Hinged Aluminum Panel with inflatable seals. For openings up to 13 ft (3.96 m) width. Requires pre-installation of frame, either inside of the opening or on the exterior wall face. Requires a pressurized gas supply to inflate seal. Designed for permanent installation. Can be closed by a single operator when required. Allows unobstructed use of opening when in open position.

PRESRAY
Critical Containment Solutions
www.Presray.com

FB11/FB22

Aluminum Lift-Out Panel With Inflatable Seals

DESIGNED FOR
- Openings of any size
- Doorways, loading docks, any municipal, industrial or commercial opening

PROTECTION TO
- Custom designed to match any size needs up to 40 square feet.

SEAL TYPE
- Dual inflatable for redundant protection

SEAL AREA
- 3 Sides, sill, left & right jambs

UNIQUE FEATURES
- Sill can be recessed to prevent tripping hazard
- Lightweight, panels up to 18 sq ft can typically be handled by one or two people, larger panels can be installed with fork-lift or other device
- Dual seals provide redundant protection
- Seals can be inflated by a hand pump, compressed air tank, or air compressor

INSTALLATION
- Available for new or existing construction
- Frame can be jamb mounted (in between the door frame), or face mounted (outside the door frame, attached to the building)
- For existing openings, frame is mounted to the opening using expansion anchors.
- For new construction the frame can be cast in place or bolted in similar to existing opening description

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PRESRAY
Critical Containment Solutions
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FB11/FB22
Design

Air connection ports for dual seals. Fill with compressed air from compressor, portable tank or hand pump

Handles allow for easy handling with a forklift or (for barriers less than 18 sq ft) one or two people

Slide latches lock barrier securely in opening

Dual inflatable seals provide redundant protection while ensuring a complete seal

Panel is 6061-T6 aluminum for years of maintenance free use. Can be left natural, or painted to your specifications

Conversion frame is low carbon steel (stainless steel available), and available as a jamb mount (mounts in between the left & right jambs), face mount (as shown), or cast in place for new construction

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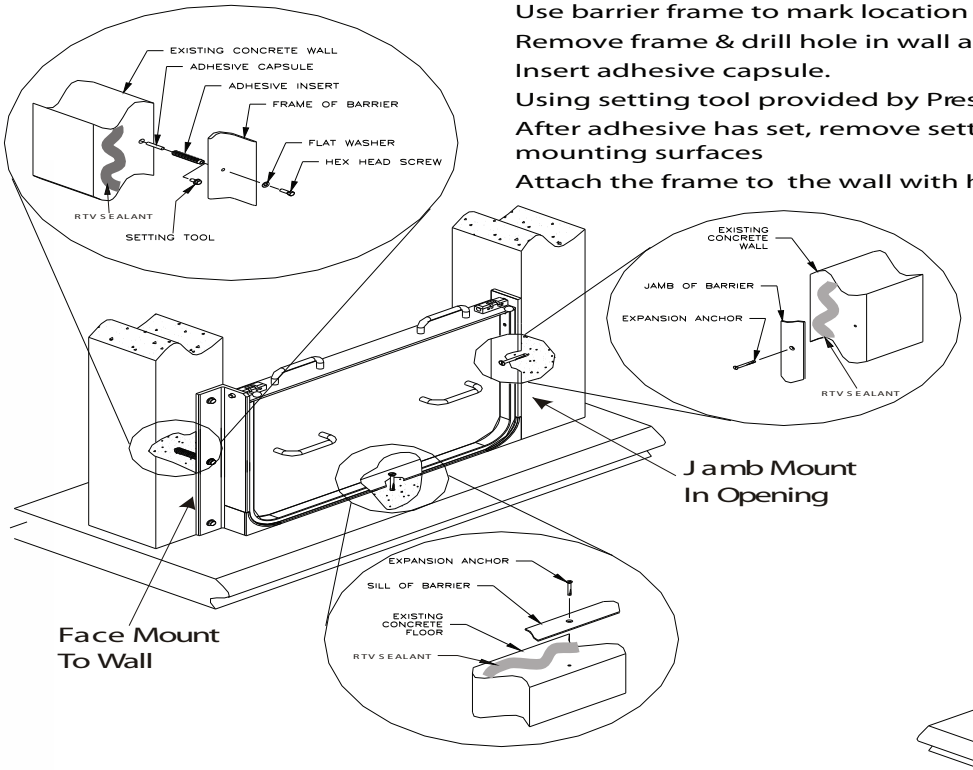
FB11/FB22
Installation Detail

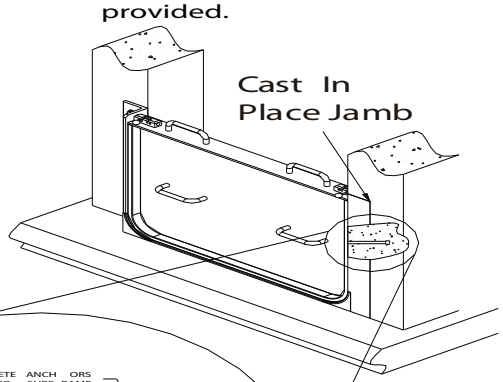
Installation Using Adhesive Inserts

Use barrier frame to mark location of holes on existing wall.
Remove frame & drill hole in wall according to the installation manual.
Insert adhesive capsule.
Using setting tool provided by Presray, drive the anchor into the hole.
After adhesive has set, remove setting tool and apply RTV sealant to mounting surfaces
Attach the frame to the wall with hardware provided.



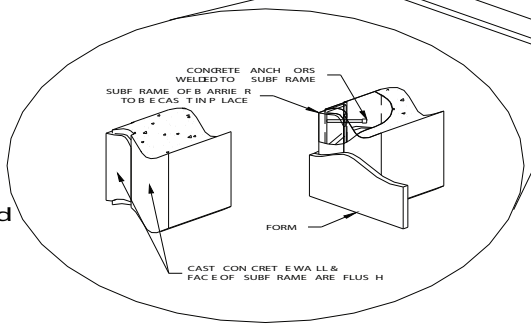
Installation Using Expansion Anchors

Use barrier frame to mark location of holes on existing wall.
Remove frame & drill hole in wall according to the installation manual.
Apply RTV sealant to mounting surfaces and attach the frame to the wall with hardware provided.

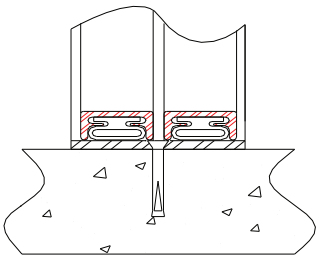


Installation When Frame Will Be Cast In Place

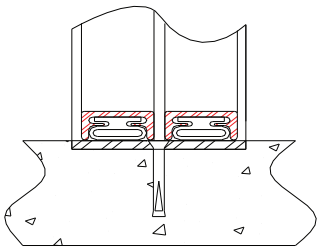
Barrier subframe is placed into the form of the wall to be cast.
After the concrete has cured, the form is removed leaving the subframe flush with the new wall.
The barrier is now ready to be attached to the subframe according to the instruction manual.


CONCRETE ANCHORS WELDED TO SUBFRAME
SUBFRAME OF BARRIER TO BE CAST IN PLACE
FORM
CAST CONCRETE WALL & FACE OF SUBFRAME ARE FLUSH

If the opening that the panel will protect has not been poured yet, the frame for the panel can be integrated with the wall during the pour. This provides an aesthetically appealing frame that is flush with the jamb.
If the opening is preexisting, you can choose a jamb mount frame that mounts between the existing jambs, or a face mount jamb that mounts on the wall to either side of the opening. Both of these designs are available with a recessed sill (as an option) that is cut into the existing floor to prevent a tripping hazzard.



Standard Sill



Recessed Sill (Optional)

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Critical Containment Solutions
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FB33

Removable Flood Panel With Compression Gasket

DESIGNED FOR
- Entry doors, garage doors, openings requiring rapid, easy to install protection where low leakage is acceptable.

PROTECTION TO
- The width is custom designed to match any protection size needs, while the height is 36”

SEAL TYPE
- Neoprene outer envelope
- Combination compression/lip seal around perimeter

SEAL AREA
- 3 sides - floor and both sides

UNIQUE FEATURES
- Patented hand-crank expandable steel frame to fit multiple openings
- Economical and easy to use and handle.
- Drop in place and deploys securely in opening in approx. 5 minutes by one person.

INSTALLATION
- Available for new or existing construction
- Optional jamb and sill frame are often required to hold back hydrostatic load
- At the first sign of a flood, simply insert the panel into the opening and expand it by turning the handle until the seals are compressed

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FB33
Design

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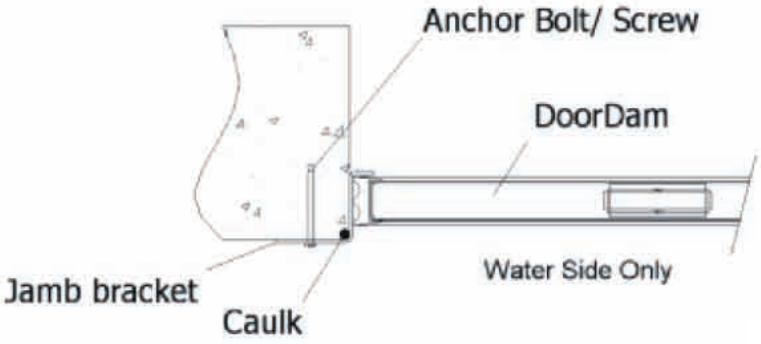
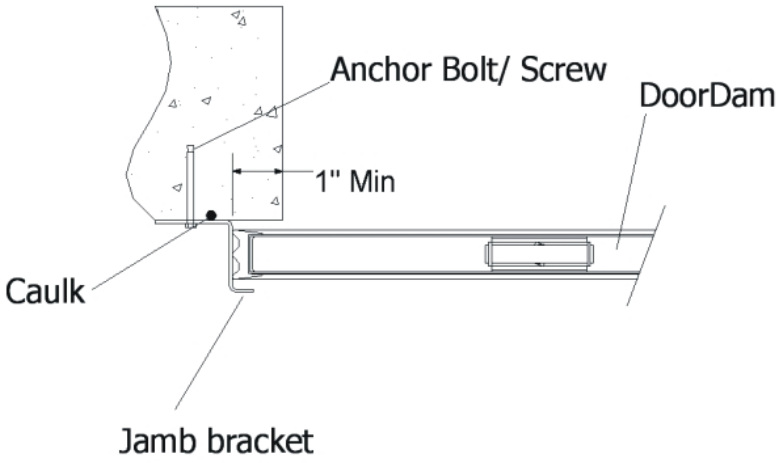
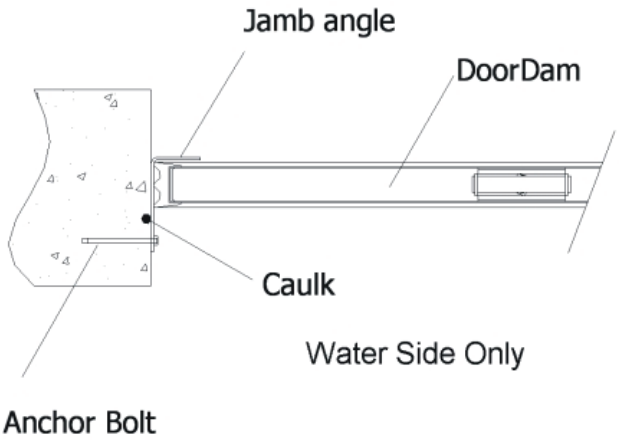
FB33
Installation Detail



Method 1 uses Z-Bracket and compression clip

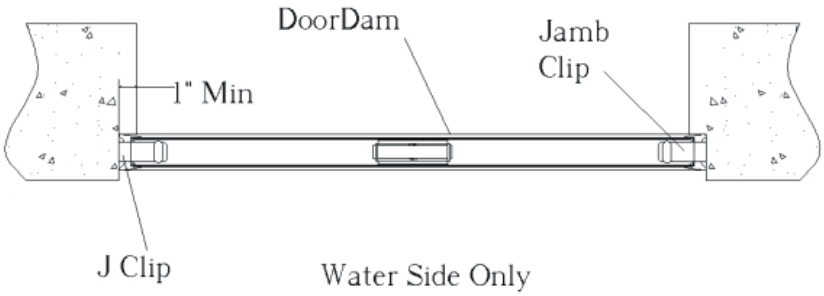
Method 2 uses Z-Bracket and compression clip mounted on building face with at least 1" of building to take water load.





Method 3 uses L-Bracket, J-Brace and compression clip

Method 4 uses J-Brace and compression clip when there is a door or other frame with at least 1" to take the water load.



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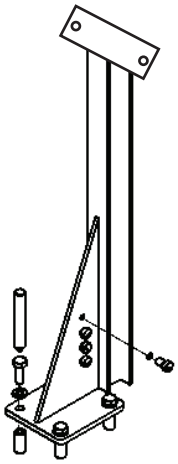
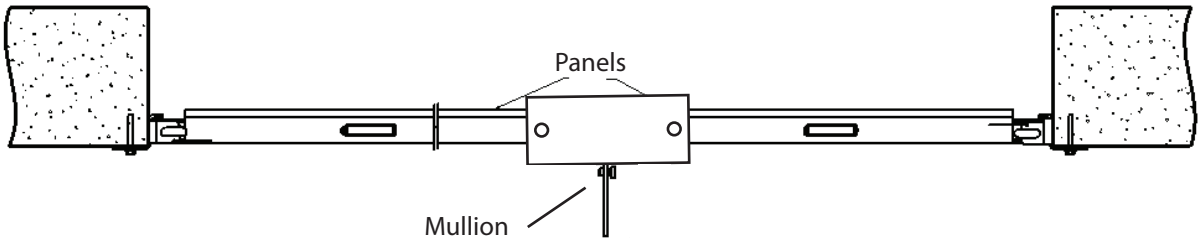
FB33
Accessories and Options



Mullion

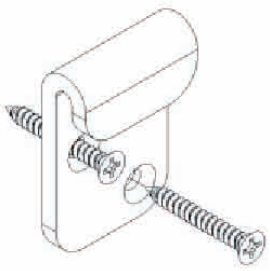
Mullion—Used to connect multiple panels. Made from aviation-grade aluminum. Anchored to concrete or other suitable surface.



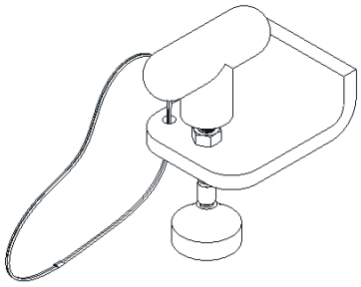
Jamb Channels- Used in unseating load applications or where the jamb sealing surface is rough.

Z-Bracket

L-Bracket



J-brace—used alone or with L-Bracket



Compression clip- used with Z-Bracket and J-Brace to provide downward force where FB33 meets the wall

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FB44

Side Hinged Aluminum Panel With Inflatable Seals

DESIGNED FOR
- Keeping flood water out of building openings or perimeter flood walls. Ideal for quick deployment requirements where a flush bottom sill is required.

PROTECTION TO
- Custom designed to match any size needs.

SEAL TYPE
- Dual inflatable for redundant protection

SEAL AREA
- 3 Sides, sill & both sides

UNIQUE FEATURES
- 3/8"thick sill can be recessed to prevent tripping hazzard
- Hinged panel glides effortlessly into place
- Dual seals provide redundant protection
- Seals can be inflated by a hand pump, compressed air tank, or air compressor
- Slide latches secure panel when in place

INSTALLATION
- Available for new or existing construction
- For existing openings, frame is mounted to the opening using expansion anchors or epoxy type anchors
- For new construction the frame can be poured in place or anchors can be used similar to existing

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FB44 Design

Air connection ports for dual seals. Fill with compressed air from compressor, portable tank or hand pump

Presray designed 6 way adjustable hinge. Low friction with oil impregnated bronze bushing provide effortless motion

Slide latch locks barrier securely in opening

Panel is 6061-T6 aluminum for years of maintenance free use. Can be left natural, or painted to your specifications

Conversion frame is low carbon steel (stainless steel available), and available in face mount or, jamb mount

Dual inflatable seals provide redundant protection while ensuring a complete seal

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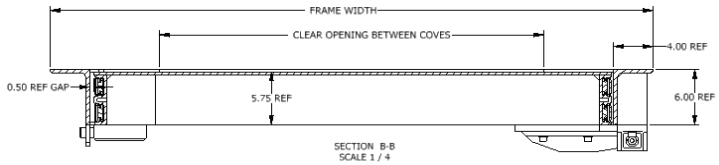
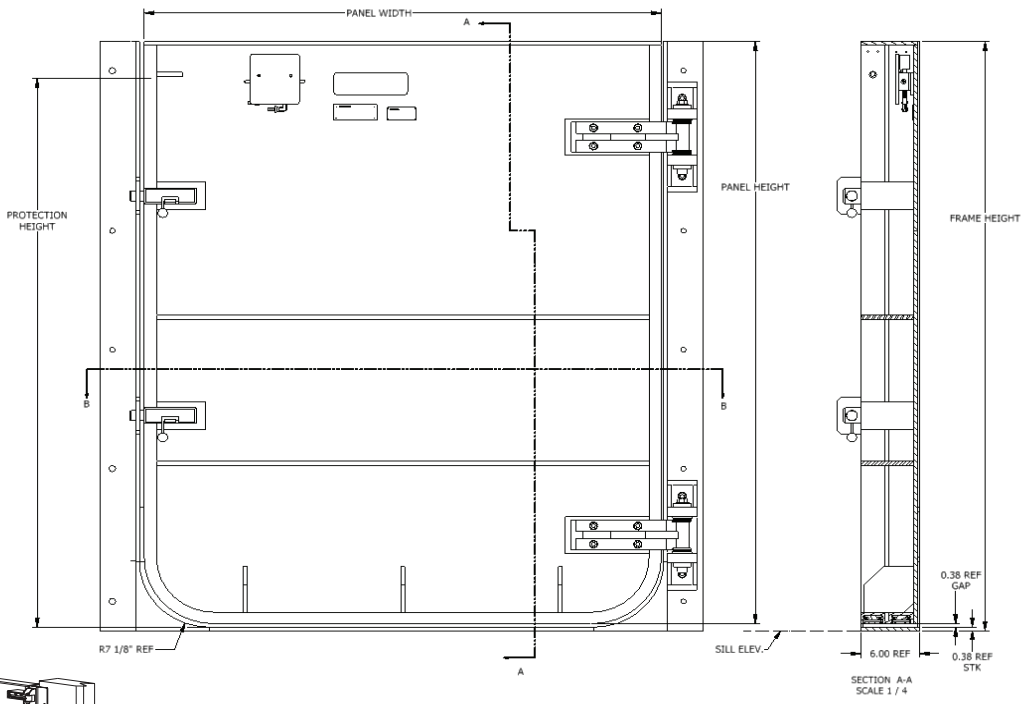
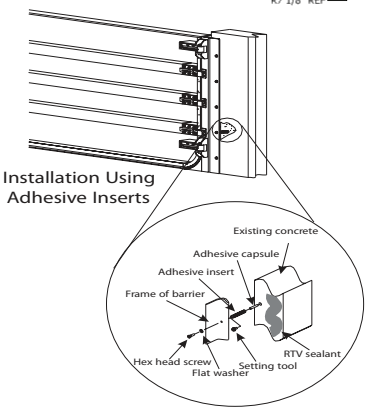
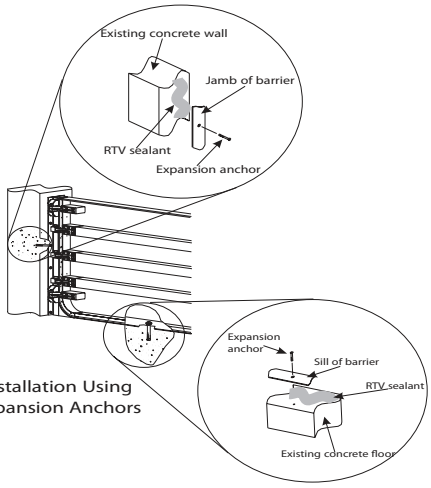
FB44
Installation Detail







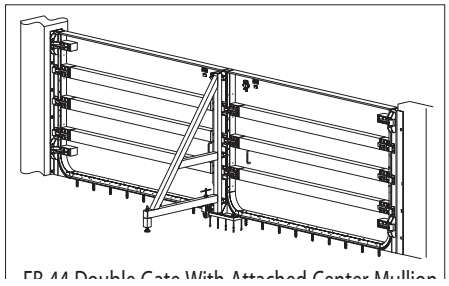
Installation Using
Adhesive Inserts



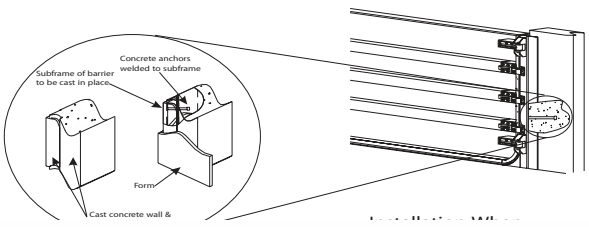
Installation Using
Expansion Anchors

The FB44 Hinged Flood Barrier provides maximum protection by simply closing a gate! The barrier is always in place, always ready to go! In the event of a flood condition, simply close the gate, lock the latch and inflate the seals. The dual redundant seals provide excellent protection.

For large width openings, dual FB44's with attached center mullion provide fast protection. Simply close the first gate (with center mullion attached) and seal and secure the mullion to the ground. After the center mullion is secured the second gate is closed and latched. Then inflate the seals. That's it



FB 44 Double Gate With Attached Center Mullion



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Easy to Order & Install

CHOOSE

Which Model Is Right For You?

DoorDam flood barriers come in three heights:

DoorDam 1800™
18-inches tall and is designed for minor to moderate flash flooding, storm drain overflow, etc.

DoorDam 2600™
26-inches high and is designed for heavy flooding and hurricane protection.

DoorDam 3600™
36-inches high and is our industrial model designed for severe flooding and hurricanes and heavy-duty protection

If you think the height of floodwaters could exceed 18-inches, the DoorDam 2600 is the right model. If water could exceed 26" then you need the industrial, heavy-duty protection of the DoorDam 3600.

Also available for large openings are the Stackable HydroLogs by DoorDam.

HydroLog 24" High

HL-11024-01 : 8' W x 24" H
HL-11024-02 : 9' W x 24" H
HL-11024-03 : 10' W x 24" H
HL-11024-04 : 12' W x 24" H
HL-11024-05 : 14' W x 24" H

HydroLogs 36" High

HL-11036-01 : 8' W x 36" H
HL-11036-02 : 9' W x 36" H
HL-11036-03 : 10' W x 36" H
HL-11036-04 : 12' W x 36" H

ORDER

Determine the Model Width...

Measure the inside width of the opening where the DoorDam will be installed (masonry to masonry). DoorDam is adjustable up to a total of four inches in width, so a measurement within the nearest half-inch is fine (round up). Do not install DoorDam on a wooden doorjamb, but on solid, watertight masonry, concrete or metal surfaces in good condition. Bracket sides are determined by looking at the water side.

If you are going to use the Face Mount Z-Bracket, add 2 inches to your width measurement where the DoorDam will be deployed.

	DoorDam 1800™	DoorDam 2600™	DoorDam 3600™
	Product Number	Product Number	Product Number
Panel Sizes			
24-28 in. / 25-29 in.	DDA18X24	DDA26X24	DDS36X25
28-32 in.	DDA18X28	DDA26X28	DDS36X28
31-35 in.	DDA18X31	DDA26X31	DDS36X31
34-38 in.	DDA18X34	DDA26X34	DDS36X34
37-41 in.	DDA18X37	DDA26X37	DDS36X37
40-44 in.	DDA18X40	DDA26X40	DDS36X40
43-47 in.	DDA18X43	DDA26X43	DDS36X43
46-50 in.	DDA18X46	DDA26X46	DDS36X46
Accessories			
Mullion	DDA-M-18	DDA-M-26	DDS-M-36
Corner Mount Z-Bracket	DDA-Z-BRK-18	DDA-Z-BRK-26	DDS-Z-BRK-36
Face Mount Z-Bracket	DDA-Z-BRK-18	DDA-Z-BRK-26	DDS-Z-BRK-36
L-Bracket	DDA-L-BRK-18	DDA-L-BRK-26	DDS-L-BRK-36
7" Spacer Z-Bracket	DDA-SZ-BRK-18	DDA-SZ-BRK-26	DDS-SZ-BRK-36
Garage Door Kits			
8-Foot	DDGK18-8	DDGK26-8	NA
16-Foot	DDGK18-16	DDGK26-16	NA

INSTALL

All Hardware Included for Easy Installation

Style 1: J-Brace Only
The J-Brace can be used by itself on a smooth and plumb building opening that can take the water load and has at least 1" step (lip) in wall. There must be at least 2" of wall on both sides of the opening for the DoorDam seals to work.

Style 2: Corner Mount
The Z-Bracket is used as a reinforced corner mount. The brackets are mounted on the corner within the doorway and ahead of the doorframe. Because of its strength, corner mount installation is recommended whenever possible.

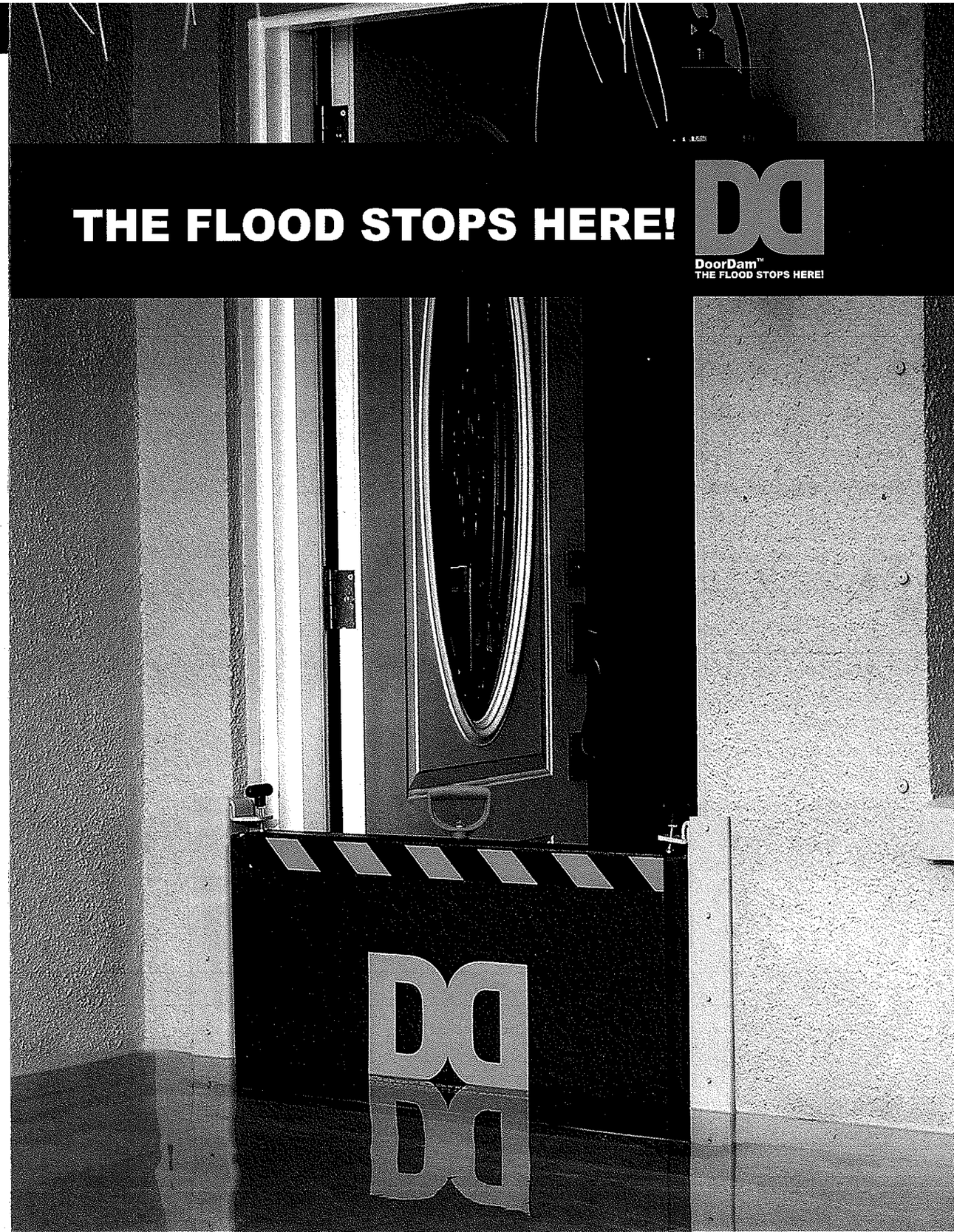
Style 3: Face Mount
Mounts on the face of the building in front of, or behind, the doorway. Be sure to leave at least 1" of the building for the DoorDam to push against while under a water load. For this style, water can be on either side of the DoorDam.

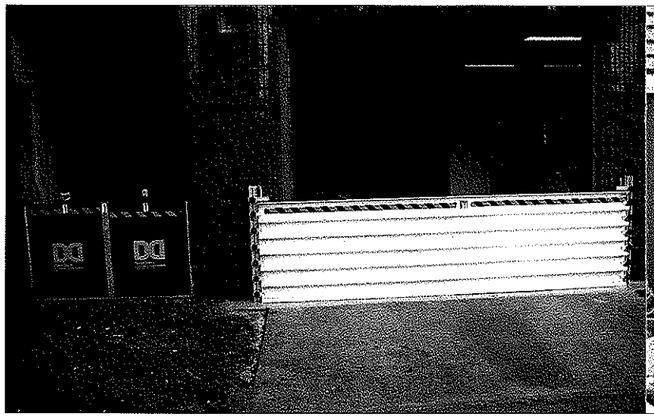
Each 1800-2600 DoorDam panel comes with (2) Compression Clips, (2) J-Braces and (2) Z-Brackets as well as the masonry screws necessary for a standard installation. If there is sufficient space in the doorjamb for the DoorDam 1800 & 2600 only, the J-Brace can be used by itself in front of a strong door frame in good structural condition. If your opening cannot accommodate the J-Brace by itself, the Z-Brackets can be used for either a reinforced corner mount or on the face of the building. If you happen to have an irregular opening and neither the Z-Brackets or the J-Brace above will work, please inquire about our special order building interface brackets. The L-Bracket mostly used for long hallways and 7" Spacer Z-Bracket used to avoid electrical outlets, hurricane shutters, and other obstructions are available.

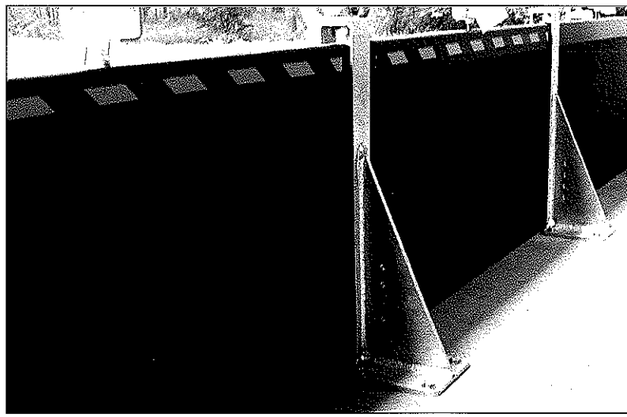
Caution: Never install DoorDam without a J-Brace or a Bracket. With proper installation, you should be able to close the door with DoorDam in place. Visit www.DoorDam.com or call 1.866.DoorDam (366.7326).

DISCLAIMER: Since building conditions and the quality of installation are beyond DoorDams control, the purchaser of this product assumes all risks related to and/or arising from the ownership, installation and use of DoorDam products.

DoorDam
THE FLOOD STOPS HERE!







Fast, Easy, Affordable Protection

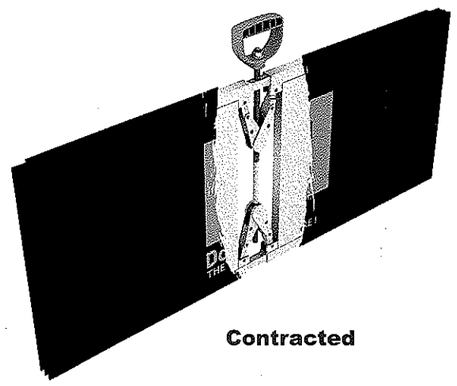
Flood waters rise fast, are unpredictable and are more widespread than ever before. DoorDam provides you with fast, easy, affordable flood protection at your fingertips. Just-in-case deployments are now hassle-free.

Revolutionary Engineering

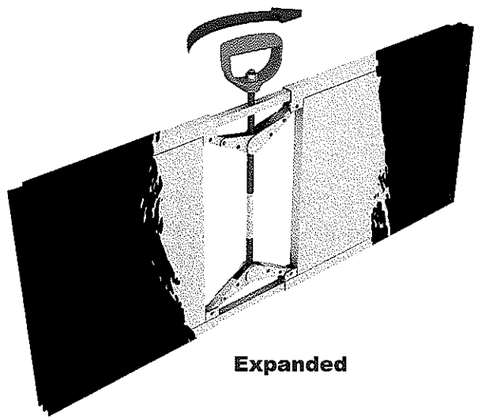
This adjustable barrier provides effective flood protection for almost any opening for home or business. Our patented design and heavy-duty construction will keep the water out, yet is lightweight and easily installed by one person.

- Lightweight rugged frame made of industrial strength welded steel beams
- Stainless steel scissor jack is strong and rust resistant
- Industrial-quality, waterproof neoprene pouch keeps the water out
- A tough, coated aluminum debris guard protects against floating objects

DoorDam easily expands to its tight, deployed position by simply turning the handle.



Contracted



Expanded

Fast Deployment- under 5 minutes!

1. Set DoorDam in place
2. Turn the handle, expanding panel to create watertight seal against walls
3. Tighten the compression clips to create watertight seal against floor
4. Evacuate – it's that easy

Please note: DoorDam is not appropriate for non-watertight structures such as wooden frame houses with ground level foundations.

> "Your product performed for us during hurricane Ike. The doors sealed as advertised and kept the storm surge out."
> **Stephen K., TX**

DoorDam™
THE FLOOD STOPS HERE!

Say Goodbye to Sandbags

One DoorDam = 50 sandbags

- Perfect for home or small business
- Deploys in three minutes or less
- Can be used again and again – saving you money

Easy to Afford

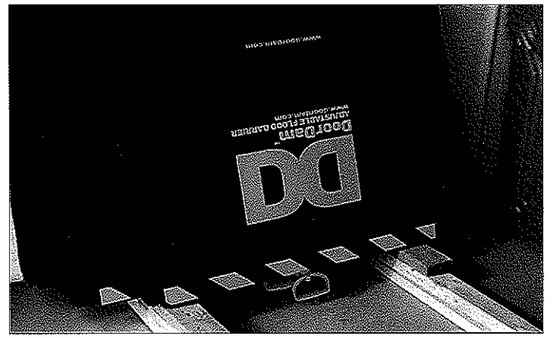
DoorDam fits the budgets of homeowners and small businesses alike. Consider the real cost of not having a DoorDam.

> "For the price of my insurance deductible, I can buy a DoorDam."
> **Stephanie V., FL**

Sandbags	DoorDam
• Approximately $3.00 each – 50 needed for single 3 ft. opening	• DoorDam will pay for itself after about two uses versus sandbags
• Requires backbreaking work to deploy	• So easy, can be done "just in case"
• Takes several strong, healthy people	• Easily deployed by one person with no tools
• Messy cleanup – sand is often toxic waste	• Simply rinse with hose and store for future use
• Takes days to get back to business	• Back to business and normal life as soon as waters recede

Easy to store

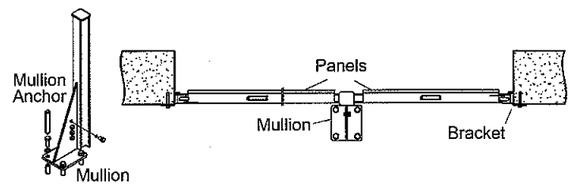
- Can be stored hanging from hooks in the garage
- Stacked neatly in a corner out of your way
- Are compact, light-weight and easy to handle



Easy to Connect Together

DoorDams can be connected side-by-side with optional mullions (sold separately) to fit wider openings of almost any length. Mullions need a smooth level waterproof concrete surface to anchor into. The Mullion foot is 11" long. Mullions are removable when not in use and plug screws (provided) protect the anchor holes from dirt and debris.

Installation note: A 7/8" or a 1-1/8" Masonry drill bit is needed for Mullion installation.



DoorDam is from Presray Corporation, America's leader in heavy-duty flood protection for 50 years.

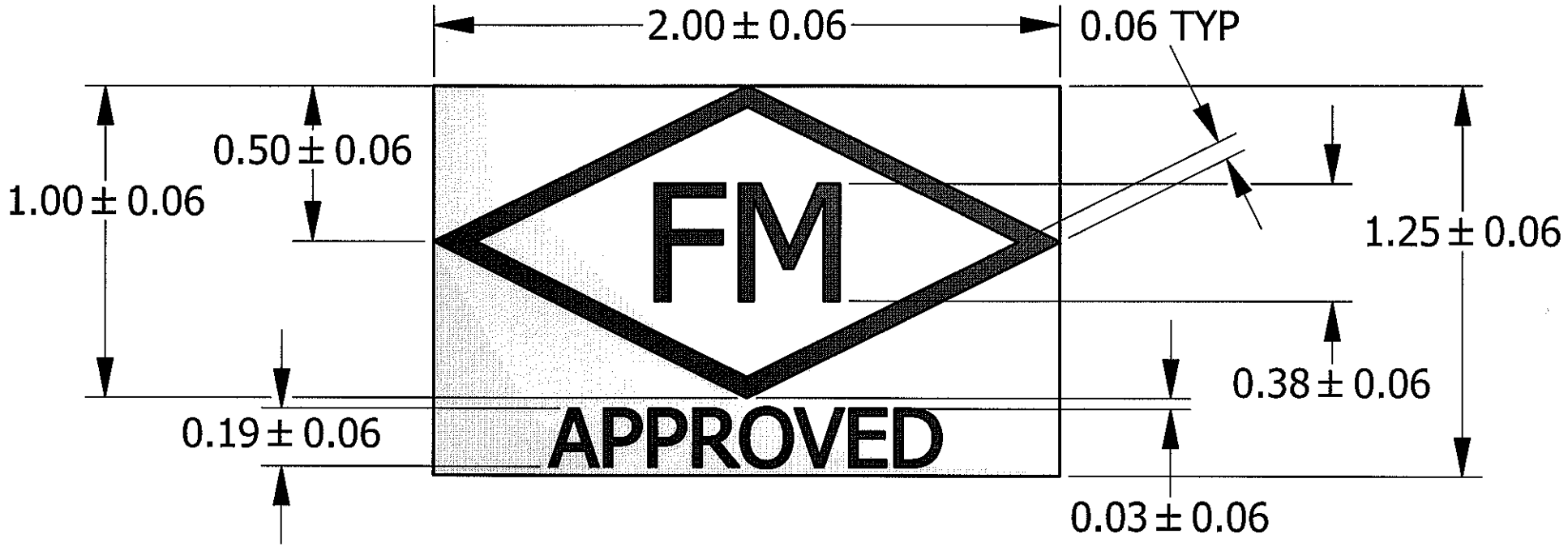
DD-FM TAG

REV -

SHEET 1 OF 1

NOTES:

1. "FM APRROVED" SYMBOL TO BE BLACK.
2. MATERIAL TO BE .010 THICK, WHITE, VELVET POLYCARBONATE OR MATTE LEXAN, WITH SUBSURFACE 3M9671 ADHESIVE.



QTY	-2	-1	DETAIL	SHT	STOCK SIZE/PART NO.	MATERIAL	DESCRIPTION

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DRAWING NOT RELEASED UNTIL DATED AND APP'D. BELOW.

3/16/2012 DATE — JF APVD.

BREAK ALL SHARP CORNERS 1/32

DO NOT SCALE DRAWING

©c PRESRAY CORP.

MATERIAL: SEE NOTE 2

PAINT/FINISH: SEE NOTE 2

QA: QC REVIEW ✓OK BAN

TOLERANCE UNLESS NOTED

FRACTIONS	± 1/32
3 DECIMAL PLACES	± .010
2 DECIMAL PLACES	± .030
ANGLES	± 2˚

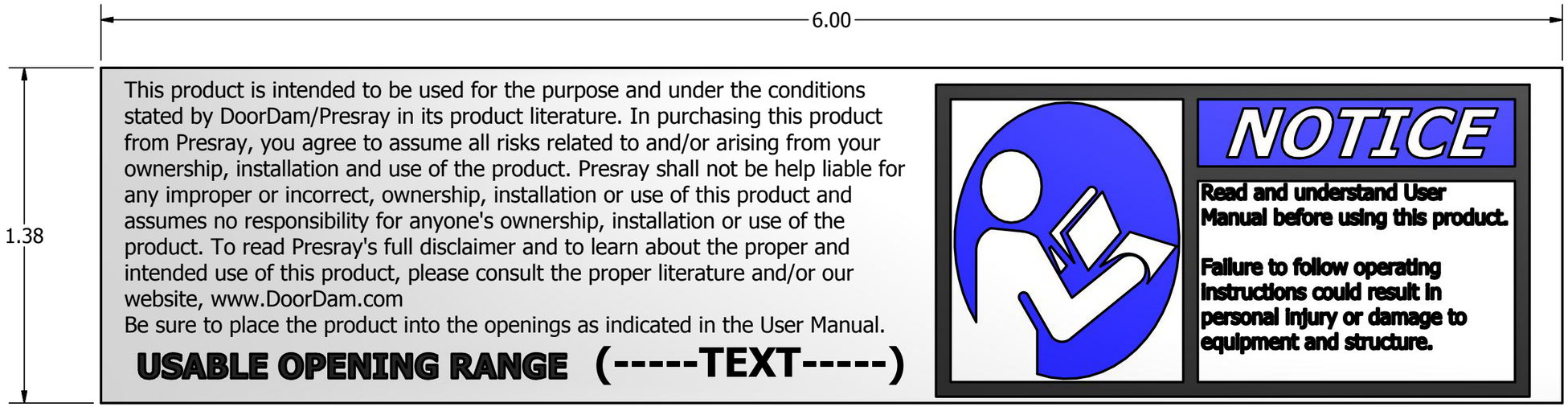
SCALE & NOTED

THE PRESRAY CORP.

WASSAIC, NEW YORK

NAME: FM APPROVAL TAG

DR. 3/16/2012	WF	DD-FM TAG	- REV
CHK. 3/16/2012	JF		
APVD. 3/16/2012	JF	SHEET 1 OF 1	


6.00
1.38
This product is intended to be used for the purpose and under the conditions stated by DoorDam/Presray in its product literature. In purchasing this product from Presray, you agree to assume all risks related to and/or arising from your ownership, installation and use of the product. Presray shall not be help liable for any improper or incorrect, ownership, installation or use of this product and assumes no responsibility for anyone's ownership, installation or use of the product. To read Presray's full disclaimer and to learn about the proper and intended use of this product, please consult the proper literature and/or our website, www.DoorDam.com
Be sure to place the product into the openings as indicated in the User Manual.
USABLE OPENING RANGE (-----TEXT-----)
NOTICE
Read and understand User Manual before using this product.
Failure to follow operating instructions could result in personal injury or damage to equipment and structure.

KEY:
TEXT = "BARRIER SIZE"(MODEL NUMBER)

PART NUMBER	TEXT
DD-LT-18X24	24"-28"(DDA18X24)
DD-LT-18X28	28"-32"(DDA18X28)
DD-LT-18X31	31"-35"(DDA18X31)
DD-LT-18X34	34"-38"(DDA18X34)
DD-LT-18X37	37"-41"(DDA18X37)
DD-LT-18X40	40"-44"(DDA18X40)
DD-LT-18X43	43"-47"(DDA18X43)
DD-LT-18X46	46"-50"(DDA18X50)
DD-LT-26X24	24"-28"(DDA26X24)
DD-LT-26X28	28"-32"(DDA26X28)
DD-LT-26X31	31"-35"(DDA26X31)
DD-LT-26X34	34"-38"(DDA26X34)
DD-LT-26X37	37"-41"(DDA26X37)
DD-LT-26X40	40"-44"(DDA26X40)
DD-LT-26X43	43"-47"(DDA26X43)
DD-LT-26X46	46"-50"(DDA26X50)
DD-LT-36X25	25"-29"(DDS36X25)
DD-LT-36X28	28"-32"(DDS36X28)
DD-LT-36X31	31"-35"(DDS36X31)
DD-LT-36X34	34"-38"(DDS34X34)
DD-LT-36X37	37"-41"(DDS36X37)
DD-LT-36X40	40"-44"(DDS36X40)
DD-LT-36X43	43"-47"(DDS36X43)
DD-LT-36X46	46"-50"(DDS36X50)

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DRAWING NOT RELEASED UNTIL DATED AND APP'D. BELOW.

3/22/2012 DATE — RL APVD.

BREAK ALL SHARP CORNERS 1/32

DO NOT SCALE DRAWING

©PRESRAY CORP.

DD-LT-TAG

REV	-3	-2	-1	DETAIL	STOCK SIZE/PART NO.	DESCRIPTION
-						

MATERIAL: PLAS

PAINT/FINISH:

QA: QC REVIEW ✓OK BAH

TOLERANCE UNLESS NOTED
FRACTIONS ± 1/32
3 DECIMAL PLACES ± .010
2 DECIMAL PLACES ± .030
ANGLES ± 2˚

SCALE 2:1 & NOTED

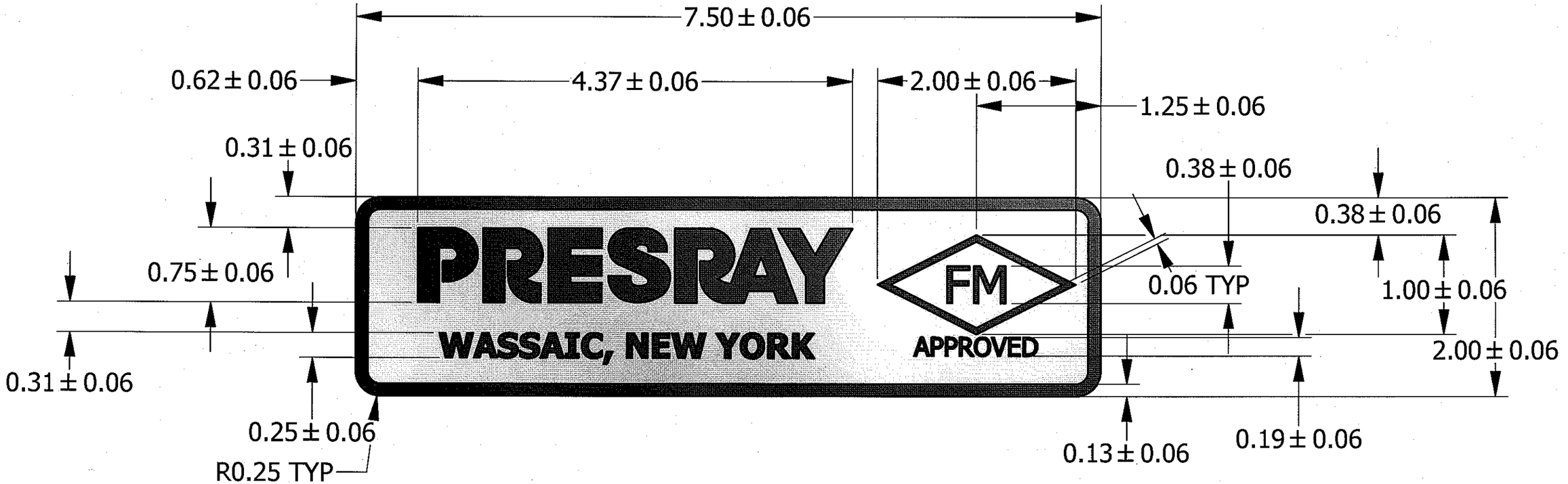
THE PRESRAY CORP.
WASSAIC, NEW YORK

NAME: DOORDAM LIABILITY TAG

DR. 3/22/2012	WF	DD-LT-TAG	- REV
CHK. 3/22/2012	RL		
APVD. 3/22/2012	RL	SHEET 1 OF 1	

NOTES:
1. "PRESRAY" LETTERING AND BORDER TO BE BLUE.

2. "WASSAIC, NEW YORK" AND "FM APRROVED" SYMBOL TO BE BLACK.



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DRAWING NOT RELEASED UNTIL DATED AND APP'D. BELOW.

3/16/12 DATE — APVD.

BREAK ALL SHARP CORNERS 1/32

DO NOT SCALE DRAWING

©PRESRAY CORP.

PPR34314

REV	-3	-2	-1	DETAIL	STOCK SIZE/PART NO.	DESCRIPTION
-						

MATERIAL: 1/8 ALUM

PAINT/FINISH: SEE NOTES

QA: QC REVIEW ✓OK BAN

TOLERANCE UNLESS NOTED

FRACTIONS	± 1/32
3 DECIMAL PLACES	± .010
2 DECIMAL PLACES	± .030
ANGLES	± 2˚

SCALE & NOTED

THE PRESRAY CORP.

WASSAIC, NEW YORK

NAME: PRESRAY / FM APPROVAL NAME PLATE

DR. 3/16/2012 WF

CHK. 3/16/12

APVD. 3/16/12

PPR34314 REV -

SHEET 1 OF 1

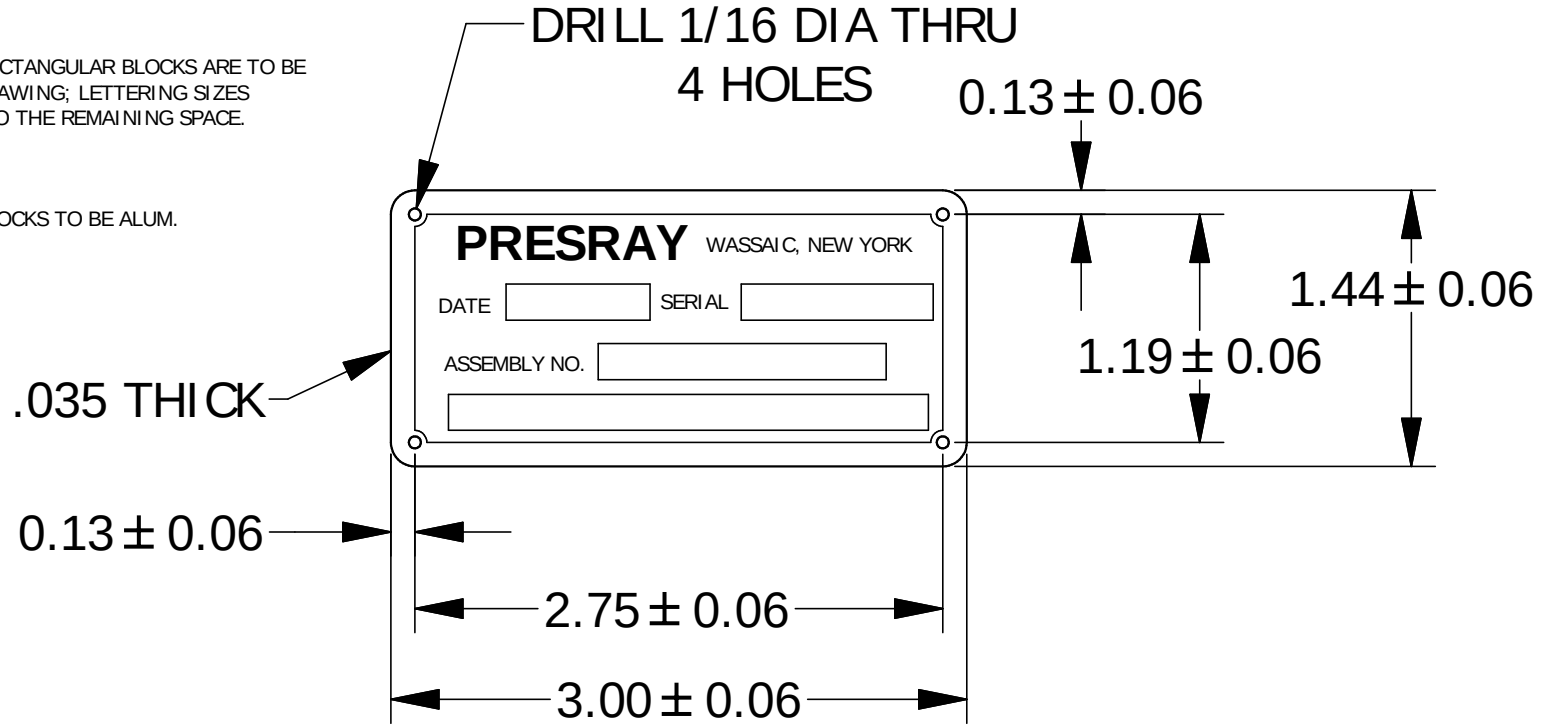
PRS555	B
	REV
SHEET 1 OF 1	

DATE	REV	DESCRIPTION	DR	CHK	APVD	QA
7/18/69	A	REVISE & REDRAWN	ERC			
8/12/09	B	CHG ADDRESS, WAS PAWLING	EH	WF	WF	CO

NOTES:
1.-SIZES AND POSITIONS OF RECTANGULAR BLOCKS ARE TO BE SCALED FROM DOUBLE SIZE DRAWING; LETTERING SIZES SHOULD BE PROPORTIONATE TO THE REMAINING SPACE.

2. BACKGROUND TO BE BLUE.

3.-LETTERING, BORDER AND BLOCKS TO BE ALUM.



QTY	-2	-1	DETAIL	SHT	STOCK SIZE/PART NO.	MATERIAL	DESCRIPTION

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DRAWING NOT RELEASED UNTIL DATED AND APP'D. BELOW.

7/18/69 — DATE

RRG — APVD.

BREAK ALL SHARP CORNERS 1/32

DO NOT SCALE DRAWING

©c PRESRAY CORP.

MATERIAL: 0.35 THK ALUM

PAINT/FINISH: BACKGROUND BLUE
SILVER (ALUM LETTERS)

QA: QC REVIEW ✓OK CO

TOLERANCE UNLESS NOTED

FRACTIONS	± 1/32
3 DECIMAL PLACES	± .010
2 DECIMAL PLACES	± .030
ANGLES	± 2˚

SCALE: 1/1 & NOTED

THE PRESRAY CORP.

WASSAIC, NEW YORK

NAME: NAMEPLATE

DR. 7/18/69	JEA	PRS555	B
CHK. 7/18/69	RE		REV
APVD. 7/18/69	GC	SHEET 1 OF 1	